Natural Gas Storage: Opportunities and Challenges

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AEC Storage and Hub Services

- **Business unit of Alberta Energy Company Ltd.**
  - **Largest producer of Canadian natural gas**
  - **Among the largest North American independents**
    - **1.4-1.5 Bcf/day in 2001**
- **Committed to growth in independent gas storage business, through development, expansion, acquisition and contracting:**
  - **own and operate 124 Bcf WGV**
  - **9 Bcf of contracted capacity**

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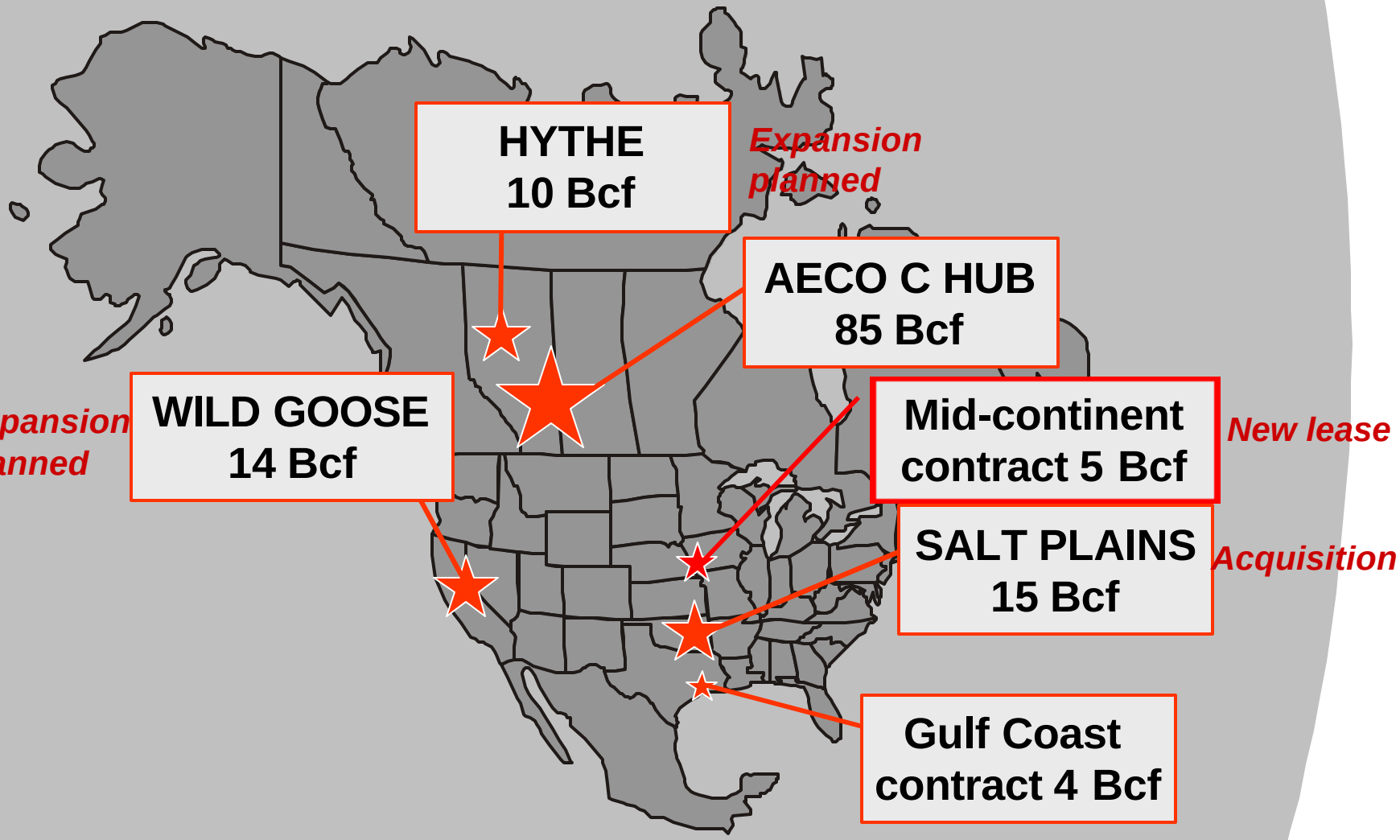
AEC Storage and Hub Services



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Opportunities and Hurdles for Storage Developers

Opportunities:

- Tight supply, price volatility increases storage value
- Gas-fired power gen needs storage for reliability, flexibility
- Growing gas market
  - storage can be alternative to overbuilt pipeline system

Hurdles:

- Volatile cushion gas costs, fuel costs
- Most storage services still too highly regulated
- Urban sprawl, NIMBY issues

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How Much New Capacity is Required?

- NPC study of market growth 1998-2015:

U.S. gas consumption +42% (22 Tcf to 31.3)

↓

Peak day demand +37% (111 Bcf to 152 Bcf)

↓

Storage capacity +25% (3.2 Tcf to 4 Tcf)

Actual storage needs difficult to forecast:

- **competes with DSM, fuel switching, in meeting peak demand**

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Where will new storage capacity come from?

Probable economic ranking of opportunities:

- **Optimization of existing facilities**
  - **commercial**
  - **technical**
- **Expansion of existing facilities**
  - **new pools, caverns**
- **Storage substitution: replace existing, inefficient facilities, with new capacity in same market**
- **New, incremental facilities**

Salt Caverns or Reservoirs?

- Perception that salt caverns can best meet the needs of the market:
  - high deliverability
  - low ratio of cushion gas to working gas
- Reservoir storage developed with current upstream technology can provide similar service at lower cost:
  - identification of high quality reservoirs
  - horizontal wells
  - 3D seismic
  - reservoir, facility optimization

Too Much Capital Tied Up in Cushion Gas

- **Ratio of Cushion Gas to Working Gas:**
  - **Salt Cavern facilities** **0.37**
  - **AEC's reservoir storage** **0.36**
  - **All other US storage** **1.10**
- **Over 4 Tcf of cushion gas in older reservoir, acquifer facilities**
- **Opportunities:**
  - **blow down, replace with more efficient facilities**
  - **re-develop with modern upstream technologies**

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Further De-regulation of Utility Storage Required

- Owners of utility storage assets need incentives to optimize
- Utility shareholders must benefit from:
  - a) innovative services that more fully utilize existing capacity
  - b) technical optimization of capacity
  - c) reduction of cushion gas
- More timely regulatory processes
- Alternative: divestment of storage assets, contracting for storage services

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Gas Storage Development Conclusions

- Storage values increasing, but few new projects
- High M&A activity in independent storage
- Storage development increasingly a ‘technology’ play
  - no “low hanging fruit”
- Storage ‘re-development’ has potential
- Over-regulation discouraging investment, rationalization of capacity
- Capacity additions likely to lag demand

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